

him for any sphere in life which he might intend to adopt. It would be time enough to teach military subjects when the candidates for the army got into the military schools. Up to that time their education should be general, and not special. The proposed change was entirely with the view of inducing the public schools, such as Wellington, Marlborough, and others, besides Eton and Harrow, to co-operate with the authorities in the endeavour to get rid of cramming." The Marquis of Salisbury believed that "nothing would ever get rid of cramming so long as there was a system of competitive examination. Cramming belonged to competitive examination. He ventured to say that the Government were pursuing their object in rather a dangerous way. If there was a difference between the great public authorities and the public schools, the former should lead. With respect to the question of English literature, he did not understand why boys should not be expected to get a general knowledge of it in the same way that they were expected to have a general knowledge of Latin literature. In France and Germany the language, literature, and history of the country were systematically studied, but we seemed to treat them as matters of no importance, or as things which might be learnt in the nursery, or accidentally in conversation after leaving school."

THE Ninth Annual Meeting of the members of the Sunday Society was held at 9, Conduit Street, W., on Monday last, Prof. W. H. Corfield, M.D., in the chair. The annual report, which was read by Mr. Mark H. Judge, Honorary Secretary, set forth the work of the Society during the past year. It referred at considerable length to the action taken in the House of Lords, and pointed out that the policy embodied in the resolution proposed this year by Lord Thurlow at the request of the National Sunday League differed from that advocated by Lord Dunraven and other representatives of the Sunday Society in both Houses of Parliament. Statistics of the Society's Sunday Art Exhibitions were given. The movement in the provinces had been successful at Newcastle-on-Tyne, the Public Library there having been opened on Sundays by the Town Council. His Grace the Duke of Westminster was elected President of the Society.

Two shocks of earthquake were felt at San Francisco in the afternoon of March 25. The series of earthquakes which began on the 25th ult. continues in the south of Hungary. In Vukovar some slight shocks were again felt on March 27 at 11 p.m. On the night of the 29th about sunset a pretty severe shock of earthquake was felt at Sinope and other places in the neighbourhood. In the town of Costamboul some old buildings fell, but no lives were lost.

THE Easter Monday and Tuesday excursion of the Geologists' Association this year will be to Lincoln; on Saturday, April 26, there will be an excursion to Guildford.

THE number of high-level meteorological stations has been recently increased by the opening of a station at Poni, on the Suram Pass of the Great Caucasus.

MR. CHARLES SMITH, Fellow and Tutor of Sidney-Sussex College, Cambridge, to whose valuable treatise on "Conic Sections" we have already drawn attention, has prepared a new elementary mathematical work which will bear the title, "An Elementary Treatise on Solid Geometry." It will be published almost immediately by Messrs. Macmillan and Co.

THE additions to the Zoological Society's Gardens during the past week include two Malbrouck Monkeys (*Cercopithecus cynosurus* ♀ ♀) from West Africa, presented by Messrs. G. Somerford and G. A. Zobel; an Axis Deer (*Cervus axis* ♀) from India, presented by Mr. L. B. Lewis; a Bosman's Potto (*Pterodicticus potto*) from West Africa, presented by Capt. Grant Elliott; a Common Squirrel (*Sciurus vulgaris*), British, pre-

sented by Mr. P. Aug Holst; three Herring Gulls (*Larus argentatus*), European, presented by Mr. S. Aloof; a Rose-crested Cockatoo (*Cacatua moluccensis*) from Moluccas, presented by General Rundall, R.E.; a Grecian Ibex (*Capra agagrus*), South-East European, presented by Mr. Thomas B. Sandwith; a Smooth Snake (*Coronella levis*), British, presented by Mr. W. H. B. Pain; a Greater Sulphur-crested Cockatoo (*Cacatua galerita*) from Australia, a Rose-coloured Pastor (*Pastor roseus*) from India, deposited; a Leopard Tortoise (*Testudo pardalis*) from South Africa, an Egyptian Cobra (*Naia hve*) from Africa, purchased; a White-fronted Lemur (*Lemur albifrons*), a Vulpine Phalanger (*Phalangista vulpina*), born in the Gardens.

#### OUR ASTRONOMICAL COLUMN

THE DOUBLE-STAR  $\alpha$  HERCULIS.—Smyth, in his "Cycle of Celestial Objects," attributes to Sir William Herschel the discovery of the duplicity of this star; but the companion was detected two years earlier than Sir William's first observation, and under somewhat curious circumstances. It was perceived by Maskelyne while observing the meridian passage on August 7, 1777, and only seven days later Christian Mayer, also observing the transit of the star with his mural quadrant, noted it to be double. The particulars are detailed in Mayer's work, "De Novis in Cælo Sidereo Phenomenis," published at Mannheim in 1779. He had communicated to Maskelyne a number of his results bearing upon the double-stars; and the Greenwich astronomer, in replying towards the end of 1777, relates that he had observed a similar phenomenon in  $\alpha$  Herculis on the date given above, "et videns valde obstupui," he remarks, since he had so often observed the star on the meridian without perceiving the companion. Maskelyne considered it of the sixth magnitude, the principal star being estimated a third; the latter he judged to be reddish, and the companion pale; Mayer, who discovered the smaller star on August 14, called it a seventh or eighth magnitude.

Adopting Sir George Airy's intervals for the transit-wires in Maskelyne's instrument, we find from a number of transits of the two components—

For about 1778.2 ...  $\Delta \alpha$  ... + 0.324s.,  $\Delta \delta$  ... - 2".80.

And hence the angle of position  $120^{\circ}8$ , and the distance  $5''.47$ .

Mayer's observations extend from August 14, 1777, to August 26, 1779. His differences of right ascension vary from 0.75s. to 0.2s., and those of declination from  $6''$  to  $1''.8$ , while his estimates of the magnitude of the smaller star vary from 6 m. to 8.9.

Sir William Herschel's first measures were made on August 29, 1779. Taking means of those made between this date and 1783.252, we find—

Position, 1782.36 ...  $116^{\circ}9$  Distance, 1780.33 ...  $4''.88$ .

VARIABLE STARS.—Mr. Burnham, in a note to No. 545 of his recently published Catalogue of 748 double-stars, remarks: "The principal star is strangely wanting in many of the star catalogues." It was observed by Lamont in zone 364, and estimated 5 m.; it does not occur in Lalande, D'Agelet, or Bessel. On Bremicker's Berlin map it is marked 7 m., and it is 6 m. in Harding's Atlas. In the *Uranometria Argentina* it is called 6.3; Gould has no note upon it. We have also the following estimates:—

1879.345	Burnham ... ..	6.5
— '549	Stone (Cincinnati) ... ..	7.5
— '575	Burnham ... ..	6.5
1880.442	Stone ... ..	6.0
— '520	Burnham ... ..	5.5
1881.383	" ... ..	6.5
— '578	" ... ..	6.8

The star may perhaps vary from about the fifth to the seventh magnitude, but systematic observation is wanted to decide. Its position, brought up from Lamont to 1885.0 is in R.A.  $17^h. 8m. 26.9s.$ , N.P.D.  $104^{\circ} 27' 4''$ .

D'Agelet 5057 (a star to which attention has been already called in this column) deserves frequent examination. It was observed by D'Agelet on July 26, 27, and 29, 1783, being twice noted 6 m. and once 6.5. It was not observed either by Lalande or Bessel, but in the *Durchmusterung* we find it estimated only

9'4. Its place for 1885.0 is in R.A. 19h. 27m. 35'5s., N.P.D. 72° 29' 54".

Nos. 2577-78 of the *Astronomische Nachrichten* contain the late Prof. Julius Schmidt's results of observations of variable stars made at Athens in 1883, which were communicated about a fortnight before his sudden decease.

### ON THE AURORA BOREALIS IN ICELAND

AS considerable doubt has hitherto prevailed as to the form and nature of the aurora borealis in Iceland, I have decided to pass the winter here in Reykjavik, in order to study the phenomenon on principles which I followed during my sojourn at Kautokeino last winter, 1882-83 (*NATURE*, vols. xxvii. p. 394, and xxviii. p. 397).

I arrived here about the middle of October last, and began my regular observations on November 6; and although the series of observations as yet is brief, and, through very unfavourable weather, not so complete as might be desired, I believe that a few preliminary remarks on this phenomenon may not prove without interest, particularly as the appearance of the aurora borealis here is somewhat different to what we might expect and what is generally assumed.

Weather more unfavourable than I have encountered since my arrival it is impossible to imagine. A sky nearly always cloudy, rain, snow, and storm following upon storm—such have its chief characteristics been. A clear sky is quite an exception, and when it occurs there is a wind blowing so keen and cutting that no human being can walk out of doors for any length of time. Iceland is, no doubt, not favoured with very congenial weather, but such a winter as the present must, according to the dwellers here, be considered as quite an exceptional one.

I have shown in Table I. the average cloud calculations of each evening hour (the observations begin generally at 5 p.m., and continue until two or three hours after midnight) from November 6 to January 28. Here 5 indicates the hour from 5h. to 5h. 59m., &c. The scale is the usual one, viz. from 0 (clear) to 10 (cloudy).

TABLE I.

Hour	...	5	6	7	8	9	10	11	12	13	14	15	Average
Clouds	...	8.06	7.72	7.51	7.83	7.90	8.10	8.24	8.03	7.30	8.29	8.66	7.91

If an average of the nebulosity on each evening be taken, each value of the scale will fall on the number of days shown in Table II. The former are also calculated in per cents. of the total days (83).

TABLE II.

Clouds	...	0	1	2	3	4	5	6	7	8	9	10
Days	...	2	8	2	1	4	1	1	9	9	15	31
Per cent.		2.4	9.6	2.4	1.2	4.8	1.2	1.2	10.8	10.8	18.1	37.3
		14.5		7.2		22.9		55.4				

These figures speak so plainly for themselves that any comment is needless.

Through Iceland being situated in the zone of the terrestrial magnetism, it might be assumed that the aurora borealis attained a high degree of development and splendour here; but this has not been the case this winter, in Reykjavik at all events, even allowing for the unfavourable weather. The auroræ here are generally faint and wanting in force; it is only seldom that there is any energy in the movements, and but rarely that the forms are sharply defined, while the outlines are dim and vague.

There have therefore only been a few occasions on which I have been able to effect somewhat satisfactory measurements with the auroral theodolite of azimuth and the height. The aurora doubtless often reaches far up on the sky, and even travels far down on the southern horizon, but the force of light is very small. In spite of the circumstance that Reykjavik lies—judging by the appearance of the aurora borealis on the horizon—much nearer to the auroral maximum zone than Kautokeino, the appearance of the auroræ in the two places cannot be compared. There was activity, force, and colour; here is vagueness, uncertainty, and want of character. Only once—on January 25—I observed an aurora during one hour which was a true Arctic one, with defined, elegant outlines, intense play of colour, and bold movements.

The more extensive auroræ which I saw in Kautokeino generally finished by the bands or streamers changing into luminous clouds, which again shortly afterwards assumed the wave-like motion I have called "coruscation," and which often lasted for hours, flooding the entire heavens. This form of the aurora borealis I have not observed on a single occasion here, which appears to me to be a very remarkable circumstance. Extensive auroræ finish here through the simple vanishing of the light or by the changing of the forms into faint, luminous clouds consisting of stripes (north-east to south-west), or vague, cloudy bands which by degrees lose in energy and finally die away.

Any real corona I have not seen as yet, and the usual colours, viz. red and green, I have only noted on six occasions.

On forty of the eighty-three evenings I have effected observations there have been auroræ, which is rather a high figure when the unfavourable weather conditions are taken into consideration. But the aurora is, however, not always present when the sky is clear or nearly so; on the contrary, it is not nearly as frequent here as in Kautokeino. This will be understood from Table III., which has been framed on the assumption that all observations were equally divided over the twelve hours, viz. from 4h. to 15h., which also shows that in every hour there was observed one hundred times either aurora or clear sky without aurora. The lower figures show in per cents. when the sky was without aurora.

TABLE III.

Hour	...	4	5	6	7	8	9	10	11	12	13	14	15
W	...	75	72	77	88	91	97	89	83	63	53	62	33
o	...	25	26	23	12	9	3	11	17	37	47	38	67

In consequence of the great magnetic declination in Iceland, viz. about 40° N.W., the points of culmination of the arcs and bands fall far outside the astronomical meridian, and their direction is nearly north-east to south-west. From the measurement of twenty arcs, partly on the north, partly on the south horizon, I have certainly only obtained an azimuth of 22° 4' W., but I do not accept this as any definite result before more complete observations are in my hands.

The intensity of the aurora borealis here I have defined approximately in Table IV. by four degrees, viz. from one to four. From the total determinations of intensity for every hour when no aurora is visible, in spite of clear sky, being determined by 0, the following average figures are obtained:—

TABLE IV.

Hour	...	5	6	7	8	9	10	11	12	13	14	15	Average
Intensity	...	0.90	0.76	1.04	1.26	1.45	1.05	0.82	0.59	0.40	0.44	0.03	0.95

From these figures a decided maximum of intensity is manifest between 9h. and 10h.

As regards the position of the auroræ on the sky and the relative frequency of the various forms, I append a tabular list of observations. The abbreviations made in the same are these:—

<i>HN</i> .	Aurora stands near the northern horizon, i.e. the magnetic north.
<i>LN</i> .	" " low in the north.
<i>N</i> .	" " in the north (to a height of about 45°).
<i>Nh</i> .	" " on the northern horizon (to a height from the horizon about 70°).
<i>Nh-Z</i> .	" " on the northern horizon to zenith.

Further, *Z* indicates through or on both sides of the zenith *S*, south; *SZ*, south of zenith; *Sh*, south horizon; *t*, over the whole sky;  $\div$ , with the exception of; *N + S*, auroræ in the north and south (but not in zenith); *o*, no aurora. Below *N'* I have collected the values of *HN*, *LN*, *N*, *Nh*, and *Nh-Z*; and under *S'* those of *SZ*, *Sh*, and *S*; and under *t'* the others, with the exception of *o*.

Table V. gives percentally, assuming an evenly divided time of observation, a view of the position of the auroræ in the sky.

Table VI. shows the relative appearance of the various forms calculated percentally on the same basis as in the previous tables. Here *I* indicates one arc; *I=*, several arcs; *II*, a band; *II=*, several bands; *j*, diffused; *s*, streaming; *js*, simultaneously diffused and streaming, or a variety between the two; *III*, isolated streamers, or bunches of streamers; *V*, luminous clouds